

ADVANCED SITE CHARACTERISATION WITH PASSIVE SOIL GAS

Dean Woods¹, Lowell Kessel², Harry O'Neill³

¹Douglas Partners Pty Ltd, 68 Brighton Street, Richmond, VIC 3121, AUSTRALIA

² Environmental Remediation Resources (ERR) Pty Ltd. F4 / 13-15 Kevlar Close, Braeside, VIC 3195 AUSTRALIA

³Beacon Environmental Services Inc. 2203A Commerce Road | Suite 1 | Forest Hill, MD 21050 USA

Dean.woods@douglaspartners.com.au

INTRODUCTION

A total of four existing USTs and sumps had been removed from a former industrial site in Southbank, inner Melbourne, however, some residual contamination in validation samples and moderate groundwater contamination indicated that not all sources had been removed. High levels of TPH C10-C36 and naphthalene were detected in both soil and groundwater and further sources were considered.

Douglas Partners Pty Ltd (DP) identified the following assessment options:

- (a) Soil sampling on a 5x5 m grid;
- (b) Test trenches and commence delineation based on visual / olfactory observations; and
- (c) Passive soil gas (PSG) sampling to guide further works.

In consultation with the client, the PSG sampling technique were selected on the basis that it would provide greater certainty that further sources of TPH and naphthalene were unlikely to be detected (or if present enable them to be identified) and additionally that this method of investigations involved minimal disturbance and disruption to site operations.

METHODS

Taking into consideration site operations history and groundwater quality information from some on- and off-site wells, the target compounds of concern were identified to be volatile and semi-volatile organic compounds. Beacon Environmental in Maryland, USA developed a multi-sorbent based sampler in a rugged glass vial which 'captures' organic compounds from vapours to target a full suite of organics (vinyl chloride to PAHs, including naphthalene) and provide a quantitative impact map. This was the first known application of the technology in Australia. The results do not differentiate between soil and groundwater contamination, but provide a high-resolution data set to guide further soil or groundwater impact delineation.

Beacon Environmental supplied thermally conditioned sorbent PSG Samplers and full instructions. In consultation with supplier, 21 PSG Samplers were installed on a 7 m grid across the site and adjacent roadways. Up to 50 samplers can be installed by one person in a day. Samplers were installed at approximately 0.3 m depth in a 1 m deep hole. At each sample location, a pre-cleaned pipe provided with the samplers was used to sleeve the upper 0.3 m of the hole, which was then sealed at the surface. Samplers were left at the site for 4 weeks and then retrieved, sealed and dispatched to the laboratory for analysis following US EPA Method 8260C (GC/MS).

RESULTS AND DISCUSSION

Turnaround time was 2 weeks including freight to USA. Separate colour plots for each contaminant indicated elevated PCE/ TCE/ VC and PAH in different and isolated sections of the site. Follow-up soil and GW bores (total of 20) did indeed find TCE/PCE that was never before identified – however concentrations of samples collected from existing off-site groundwater wells and on-site confirmation soil and groundwater sampling were well below regulatory limits and were not a concern for the site.

Additional Naphthalene Delineation

Two distinct PAH hotspots were identified and a network of test trenches were excavated to delineate impact. Naphthalene up to 500 mg/kg was noted in soil and full remediation commenced within a sealed marquee.

Remediation

Full scale remediation commenced after defining the area of soil impact that was guided by the Beacon PSG survey. Contamination up to 4 m deep was excavated in 'hit and miss' slots and stockpiled within the marquee and then removed off-site. Groundwater contamination was proven to be decreasing and EPA determined that Cleanup to the Extent Practicable (CUTEP) had occurred. Total remediation cost was approximately \$3 m. An apartment building with 13 levels is currently under construction.

CONCLUSIONS

Passive soil gas samplers were used as a tool to identify further contamination sources within and adjacent to a residential redevelopment in Southbank, Melbourne. The approach is relatively non-invasive and involved minimal disturbance to site operations. Results were used to guide additional investigation for naphthalene which identified peak concentrations up to 500 mg/kg, requiring remediation. DP designed a fast tracked remedial program to remove and replace naphthalene contaminated soil. The site was subject to a successful CUTEP determination by EPA and received a Statement of Environmental Audit.